HONEY BEE NUTRITION

ENOUGH GOOD FOOD ALL OF THE TIME FOR EVERY BEE IN THE BUNCH
1 Cell Of Pollen
1 Cell Of Honey
1 Cell Of Water
To Make A Bee

Dr. Elbert Ja
A Honey Bee’s
Meat and Potatoes
The Meat...
POLLEN

Fats
Vitamins
Minerals
And Especially
PROTEINS
Essential Amino Acids

Crude Protein
Minimum 20% - 25%
Healthy – 30+% 

Chickens Need Only 16%, do better with 20%

<table>
<thead>
<tr>
<th>Amino Acid</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arginine</td>
<td>3.00%</td>
</tr>
<tr>
<td>Histidine</td>
<td>1.50%</td>
</tr>
<tr>
<td>Isoleucine</td>
<td>4.00%</td>
</tr>
<tr>
<td>Leucine</td>
<td>4.50%</td>
</tr>
<tr>
<td>Lysine</td>
<td>3.00%</td>
</tr>
<tr>
<td>Methionine</td>
<td>1.50%</td>
</tr>
<tr>
<td>Phenylalanine</td>
<td>2.50%</td>
</tr>
<tr>
<td>Threonine</td>
<td>3.00%</td>
</tr>
<tr>
<td>Valine</td>
<td>4.00%</td>
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</tbody>
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Protein Notes

• 55 – 120 Pounds Pollen per Year
• For Every 10g of Protein Needed, Colony Must Collect 48 g of 30% CP, or 72g of 20% CP
• High Crude Protein MAY Have Imbalance of AA
• Brood Reduction If:
  – Not Enough Pollen Collected, No Matter CP%
  – CP% Is Below 20%, No Matter How Much They Collect
Fats

- Cholesterol Needed For Brood Rearing
- Fats Are Highly Attractive To Foragers
- Have Some Microbial Activity
- High In Lipids
  - Fatty Acids, Sterols, and Phospholipids
    - Required For Membrane Growth
    - Linoleic Acid Inhibits AFB and EFB
Minerals

• Potassium, Phosphorous, and Magnesium Required By All Insects

• Sodium, Calcium and Sodium Chloride Detrimental – Just like us!

• Must have some Ash – like undigestible fiber is our diet. Some – good. Too much - Bad
Vitamins

- B Complex, A and K Essential For Hypopharyngeal Gland and Brood Development
- Vitamins Mostly Unstable In Storage.
Pollen Deficiency

• Reduced Brood Production Overall
• Reduced Longevity Of Workers
• Longer For Drones To Reach Maturity
• Reduced Fertility Of Drones
• Drones Neglected, Discarded, or Eaten
• Fewer Drones = Poor Mating and Queen Supercedure
• Starvation
Some Common Pollen Sources

Canola - ~23% CP, Minimum+ AA
Buckwheat - ~11% CP, Minimum+ AA
Sunflower - ~15% CP, Minimum+ AA
Lavender - ~19% CP, Short on Isoleucine, rest OK
Alfalfa - ~21% CP, Short on Isoleucine and Methionine
Pine - ~7% CP
Almond - ~26%CP, Short on Methionine
Pear - ~26%CP, Minimum+ AA

Crude Protein, Minimum 20 -25%, 30+% Best
Some Common Pollen Sources

Raspberry, Blackberry - ~20%CP, Min AA
Clover Sp - ~25% CP, Low Isoleucine
Blueberry – ~14% CP, Min AA
Beans Sp - ~22% CP, Min AA
Corn - ~15% CP, Min AA
Peas Sp - ~30% CP, Min+ AA
Willow Sp - ~18% CP, Barely Min AA
Locust Sp - ~25% CP, Min+ AA

Crude Protein, Minimum 20 -25%, 30+% Best
... And Potatoes
NECTAR

• Carbohydrate Source

• Primarily Sucrose Sugar and Water

• Breaks Down To:
  – Fructose (Levulose) and Glucose (Dextrose), Promotes Crystallization
  – Water Must Be Reduced To Less Than 17% or Mixture Will Ferment
  – Sugar Concentration Ranges From 5% - 75 %, Average 25% - 40%
Nectar Notes

* 7 Other Sugars Found In Nectar

• Proteins, Amino Acids, Enzymes, lipids, Organic Acids, Vitamins and Antioxidants

• Minerals – Ca, Cu, K, Mg, Mn, Na, P, Zn

• SUGAR SYRUP OR HFCS IS NOT, AND WILL NEVER BE AS GOOD A NECTAR. PERIOD
• 1 Worker Needs 11 mg Sugar/day
• A 50M Colony Eats 1 Pound Of Sugar, or ½ Gallon of 25% Nectar/Day – Just For Adults
• A 50M Colony – 350#s Sugar/Year
• People Average 22 TEASPOONS of Sugar/Day...77 Pounds/Year
Nectar Notes

• Nectar Flows Stimulate Hygienic Behavior By Cleaning Brood Nest For Room
• Nectar Availability Stimulates Brood Production and Population Expansion
• Additional Brood Stimulates Pollen Collection
• A Nectar Flow = VERY HAPPY BEES!
Nectar Deficiency

- Defensive Behavior Increases
- Fewer Pollen Foragers
- Reduced Hygienic Behavior = Higher Brood Disease Problems
- Reduced Brood, and Brood Nest Size
- Starvation
Water...

½ - 1 Gallon/Colony Each Day In The Hot Summer Months
Virtual Water...

Liters of Water/kg or liter of food

1.3 Gallons of water to produce a single almond

About 53 gallons of Water to Produce 1 POUND of Honey
What Else Are Bees Eating?
Development – Pavement Is The Last Crop
(John Miller)

And people are getting farther away...
Monocultures Are Efficient For Food...
Take land from pollen and nectar production and turn it into fuel production, and you have a problem...
Nutrition Management

Why Are You Feeding?

- Spring Build Up
  - Sugar and Protein
- Package, Nuc or Split
  - Sugar and Protein
- Queen Production
  - Sugar and Protein
- To Encourage Pollen Collection
  - Sugar
- Nectar Dearth (Bad Weather, Poor Location)
  - Sugar, maybe Protein
- Boost Winter Stores
  - Sugar and Protein
- Emergency
  - Sugar
To Stimulate A Build Up

• Thin Mix – 1:1, or even 0.75:1.

• Feed Several Small Amounts Several Times, Rather Than 1 large Amount All At Once Makes More Work, but Better Results

• What About Open Feeding?
Stimulation For Package, Nuc Or Split Feeding

Of Course, The Real Thing Is Always The Best Choice, If Available
Making Queens.
Light Syrup Stimulation Gives Lots of Royal Jelly.
Need Loads Of Protein, Too.
To Encourage Pollen Collection
To Store Sugar...

- Very Thick Syrup...2 parts sugar:1 water, or even ½ water
- Dry sugar crystals on inner cover, or in in-hive feeder
- Fondant patties
- Avoid Thin Syrup and Stimulating A Build-Up
Why Did These Bees Die?

All Of These Problems Are Preventable. Simply Put...Honey Bees Should Not Starve Overwinter. If They Do, It Is A Mismanagement Problem by The Beekeeper.
Winter bee with fat bodies, Primarily protein, but some carbohydrates

Summer bee with no fat body
Overwinter Protein
Overwinter Carbs
Emergency
HONEY BEE NUTRITION -

ENOUGH GOOD FOOD
ALL OF THE TIME
FOR EVERY BEE IN THE BUNCH
Bon Appetite
And Thank you for your Time and Attention

Honey Bee Nutrition
Kim Flottum
Editor, Bee Culture Magazine